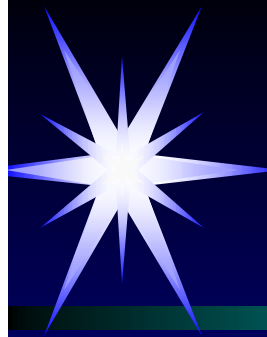


LESSONS LEARNED IN THE DEVELOPMENT OF REGIONAL EMISSION ESTIMATES FOR OPEN BURNING

Prepared by

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E.H. Pechan & Associates, Inc.



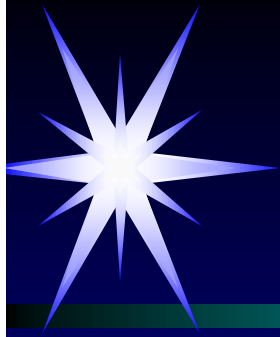
Open Burning Source Categories

- Residential Burning - municipal solid waste (MSW) or household waste;
- Residential Burning - yard waste;
- Land Clearing Debris Burning;
- Construction & Demolition (C&D) Waste Burning.



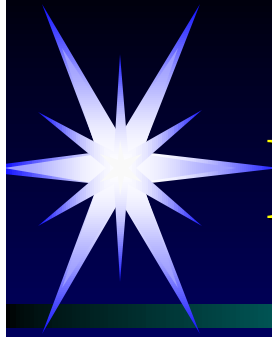
Open Burning EI Projects

- Developed county-level open burning inventory for nation for EPA's NEI
- For TNRCC, open burning emissions for 16 counties developed using State-specific data, adjustments for RE
- For MANE-VU, performed scoping study and developed survey methods and recommendations to obtain activity data



TNRCC General Approach

- For residential burning, developed State-specific per capita waste generation rates as basis of activity, surveyed local officials on enforcement of open burning rules in their jurisdictions to estimate rule effectiveness.
- For land clearing debris burning, used NEI method, but obtained more representative local data to use as basis for acres of land cleared.



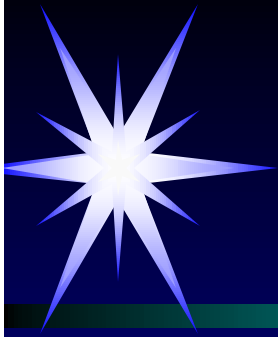
MANE-VU General Approach

- Determine where local prohibitions exist for open burning;
- Develop lists of local agencies to survey regarding local open burning activity (e.g., local fire, environmental, or health departments);
- Develop surveys to gather: 1) open burning activity data (where it is allowed); and 2) information to estimate rule effectiveness (where it is prohibited).



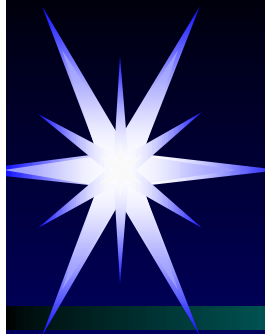
MANE-VU General Approach (cont.)

- Perform a pilot survey to test each survey instrument on whether:
 1. the questions are reasonable and gather the needed responses; and
 2. the contact list itself needed to be revised.



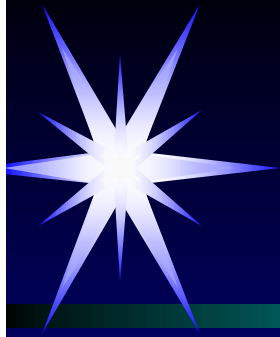
Controlled Open Burning

- States may have rules that prohibit open burning of household waste if municipal trash collection service (MTCS) available
- MTCS may vary:
 - ✓ by town within a county, and even
 - ✓ by area within a town.
- Significant effort required to characterize MTCS at the RPO level.



Controlled Open Burning (cont.)

- For areas where open burning is prohibited, uncontrolled emissions should be adjusted for CE, RE, and RP.
 - Residential waste burning, the CE is 100 percent (i.e., a ban)
 - Land clearing burning, the control may be an air curtain destructor
- Determine the extent of noncompliance, or RE.
- Exemptions from the regulation should be identified to establish RP.



MANE-VU Test Survey Results

- Residential MSW survey:
 - ✓ #households burning,
 - ✓ frequency, but not amount.

- Residential yard waste survey:
 - ✓ #households burning,
 - ✓ estimated dimensions,
 - ✓ seasonality of activity.



MANE-VU Test Survey Results (cont.)

- Land clearing debris burn permits:
 - ✖ information on burn quantities,
 - ✖ information on waste composition.

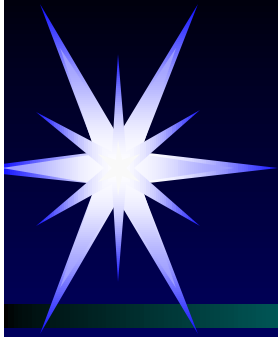
- Construction & demolition waste burn permits:
 - ✖ no information on burn quantities,
 - ✖ no information on waste composition.



MANE-VU Test Survey Results (cont.)

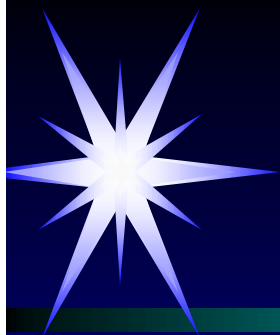
- RE survey performed when a respondent indicated that a rule existed in their area:
 - ✓ EPA guidance for estimating RE was followed in developing the survey instrument;
 - ✓ RE estimated for each category was about 40 percent;
 - ✓ Revisions to the survey were made, including the request of # violations:

$$RE = \frac{(\text{Number of anticipated burns} - \text{Number of violations})}{(\text{Number of anticipated burns})}$$



Recommended EI Methods

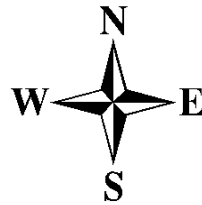
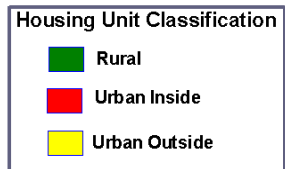
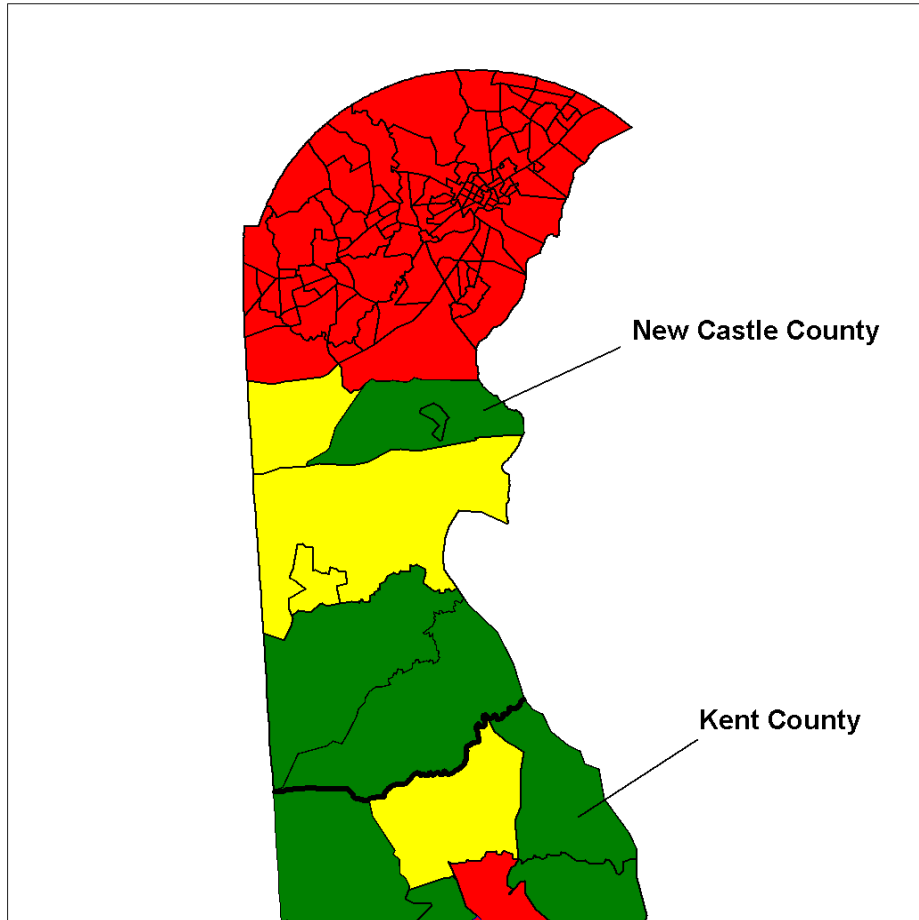
- Residential MSW and Yard Waste:
 - ✓ Use survey data to develop activity estimates - number of households that burn, frequency, mass (or volume), and timing (season);
 - ✓ Characterize activity for households in different RPO regions (e.g., state-level differences, urban vs. rural);
 - ✓ Apply the activity and RE estimates to BOC data on households.



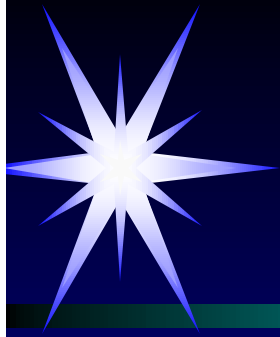
1990 Census Block Group Housing Unit Data for New Castle County, Delaware

STATE FIPS	CNTY FIPS	CNTY NAME	PLACE	PLACE NAME	TRACT	BLOCK GROUP	Number of Housing Units			
							Urban Inside	Urban Outside	Rural Farm	Rural Non-Farm
10	003	New Castle	01400	Arden village	0111	1	9	0	0	0
10	003	New Castle	01400	Arden village	0111	2	37	0	0	0
10	003	New Castle	01400	Arden village	0111	3	193	0	0	0
10	003	New Castle	01530	Ardencroft village	0111	2	109	0	0	0
10	003	New Castle	01660	Ardentown village	0111	1	120	0	0	0
10	003	New Castle	01660	Ardentown village	0111	3	13	0	0	0
10	003	New Castle	01660	Ardentown village	011204	1	0	0	0	0
10	003	New Castle	01660	Ardentown village	011204	2	0	0	0	0
10	003	New Castle	04650	Bellefonte town	0105	3	14	0	0	0
10	003	New Castle	04650	Bellefonte town	0106	1	272	0	0	0
10	003	New Castle	04650	Bellefonte town	0106	2	237	0	0	0
10	003	New Castle	19730	Delaware City	0164	3	0	0	0	0
10	003	New Castle	19730	Delaware City	0165	1	0	0	0	359
10	003	New Castle	19730	Delaware City	0165	2	0	0	3	296

DELAWARE CENSUS TRACT BY HOUSING UNIT TYPE

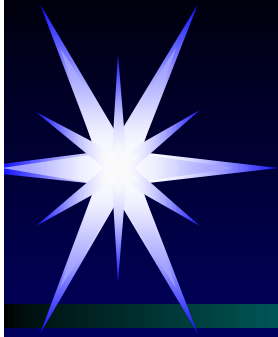


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Date: January 22, 2002



Recommended EI Methods (cont.)

- Land Clearing Debris Burning:
 - ✓ Use NEI as the basis for activity;
 - ✓ Survey of state agencies to identify more highly resolved construction activity;
 - ✓ Provide sub-county allocation via application of state agency information; or
 - ✓ net increase of housing units at the census tract level between the 1990 and 2000 census (e.g., excluding highly urbanized areas).



Recommended EI Methods (cont.)

- Construction & Demolition Debris Burning:
 - ✓ Using per capita values for C&D debris generation from Franklin Associates report, develop top-down estimates with emission factors for structural fires.
 - ✓ Bottom-up calculation of emissions for areas with C&D debris burning permit data (few areas); or
 - ✓ Develop local case studies and scale up to larger areas; or
 - ✓ Local surveys of C&D contractors (only recommended in areas where activity is thought to be significant).